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perature is a necessary attribute and the existing conditions of the working location are such that the exposure of the employees can not be prevented, is the reduction of the length of exposure. Under such conditions it is necessary to increase the force in a given location, and allow the men to work in short spells. In this way the short duration of the exposure, combined with the greater period for recuperation afforded by the long rest intervals, keeps the mechanism of the body at its highest efficiency and permits it to endure to the best of its capabilities the stress to which it is subjected during the working intervals.

THE MASSACHUSETTS ENDEMIC INDEX.

By WALTER H. BROWN, M. D., Epidemiologist, Massachusetts State Department of Health (now Health Officer, Bridgeport, Conn.).

The United States Public Health Service carries at the head of its department on the "Prevalence of Disease" in the Public Health Reports this statement of fact:

> No health department, State or local, can effectively prevent or control disease without a knowledge of when, where, and under what conditions cases are occurring.

One might very well add to this statement that the information should be received promptly, the cases investigated thoroughly, and a complete record made of the findings.

The fundamentals of the epidemiological control of disease are:

1. Prompt reporting of all cases of communicable diseases.
2. Prompt and thorough investigation of all outbreaks of communicable diseases.
3. An adequate follow-up system to check the value and efficiency of the methods of control.
4. Complete records.

With this information, plus sufficient statutory powers, there can be established an efficient, economic administrative control of communicable diseases.

It is not the purpose of this paper to discuss reporting, investigating and evaluating methods of communicable-disease control. The writer merely wishes to call attention to a method of using morbidity reports that has been adopted by the Massachusetts State Department of Health. This method has been developed in response to the peculiar needs of a state with a decentralized form of health organization. As used in Massachusetts, this method may not be applicable in other places, but the principle seems to be one that may be serviceable, both in State and municipal health work.

The prime essential for the satisfactory control of any communicable disease is the early detection of the unusual prevalence of the disease. This detection necessitates:

(*a*) A satisfactory system of morbidity reports.

(*b*) A standard by which to judge the variation in the prevalence of the disease.

System of Reporting.

The systems of reporting cases of communicable diseases vary widely in different States. In order to clarify the principle involved in the use of the endemic index, the Massachusetts system of morbidity reports will be briefly described:

The State department of health fixes the list of reportable diseases. The physicians and householders are required to report such diseases in the city and town where they are located. These reports are submitted on postal cards, furnished by the local board of health. In a majority of places these postal cards contain little or no epidemiological data. The original report cards are retained by the local board of health, who in turn, and within 24 hours, report all cases of communicable diseases to the State department of health. These reports of the local health authorities are made upon postal cards which contain no details except the character of the disease and the name and address of the patient. A duplicate of this report is mailed to the State district health officer.

Morbidity Standards.

In order promptly to detect incipient epidemics, it is necessary for the health administrator to have some sensitive indicator of the variations in the prevalence of communicable diseases. In Massachusetts this indicator is furnished by the endemic index.

This endemic index may be defined as a numerical standard for judging the relative prevalence of any reportable disease in any community. It is based upon the amount of a given disease that has been endemic in a community over a period of years. By arbitrarily separating the epidemic from endemic disease, it is possible to use the accumulated endemic experience as a basis for detecting the onset of epidemic influences. The index may be either daily, weekly, or monthly. In Massachusetts the monthly unit is the most practical.

Construction of the Endemic Index.

The details of constructing an endemic index for a given city for a given disease may be defined as follows: All reported cases of a given disease for a given month for the preceding five years are tabulated on sheets. From these sheets it becomes evident at once when an epidemic of the disease has occurred. The total reports of cases during this epidemic are excluded from the tabulation. The remaining figures are totaled and represent the endemic prevalence of the disease. The average of these figures is the so-called endemic index. This figure represents, roughly, the usual endemic experience of the city or town with the given disease for a given period of time.

This average, or index, gives a health administrator an arbitrary figure to be used as an indicator for epidemiological investigation. It has the further advantage of being a numerical standard that can be checked up by clerks who have no knowledge of communicable diseases.

The endemic index can be criticized from a statistical point of view. In constructing it we do not actually define an epidemic—we merely arbitrarily exclude evident epidemics. In adopting this course, some groups of cases may be excluded which should be included in our tabulations. However, this raises the resulting index and merely acts as a factor of safety.

An attempt is now being made to construct a practical numerical standard for the definition of an epidemic. At present the data are incomplete. We believe it can be accomplished by proper grouping of our cities and towns on the basis of population and the total incidence of communicable diseases. This information, plus the accumulated experience with the endemic index, will furnish the basis for this standard. From our practical experience with our present method this numerical standard is not a necessity.

Application in Massachusetts.

We have applied the principle of the endemic index in the following way:

A card has been devised for each city and town in Massachusetts, showing the following information:

1. The daily incidence of each reportable disease.
2. The monthly incidence of each reportable disease for the corresponding month of the previous year.
3. A monthly endemic index for each disease.
4. A weekly total of cases and deaths from all diseases.
5. A monthly total of cases and deaths from all diseases.

In addition, the population of the individual city or town is placed upon the card. These cards are made sufficiently large to contain this information for an entire year.

The method of procedure with these cards is as follows:

The daily reports of individual communicable diseases coming from each city and town are recorded by the clerk who has charge of the communicable disease postal cards. As soon as any disease in any city or town equals or exceeds the endemic index for that disease for a month, the endemic index card is at once placed in the hands of the administrator. This saves the administrator the trouble of looking over all the cards. It does not leave the unusual prevalence of any communicable disease to individual judgment and it furnishes at once the indication for administrative action.

The inclusion upon a single card of the cases of the previous years and incidence of the diseases, and the weekly and monthly total cases and deaths, furnishes all of the necessary data for the institution of two of the fundamentals of epidemiological control of communicable diseases, namely, prompt and thorough investigation of all outbreaks of communicable diseases and the evaluation of the correctness of our epidemiological diagnosis and administrative treatment of these diseases.

Conclusions.

1. That the administrative control of communicable diseases demands a sensitive standard for judging the relative prevalence of these diseases.
2. The endemic experience of a community with a disease furnishes the basis for construction of such a standard.
3. The endemic index, while not statistically accurate, is a practical administrative tool for the public health official.

SMALLPOX PREVALENCE.

During recent weeks an unusual prevalence of smallpox has been reported in a number of cities of the United States. The disease has been universally of the mild type which has been so common in this country for 20 years. The cities in which the disease has been prevalent and the numbers of cases reported by weeks are shown in the following table:

Unusual smallpox prevalence—Sept. 30 to Dec. 8, 1917.

City.	Population as of July 1, 1916 (estimated by U. S. Census Bureau).	Cases reported during week ended—										Total.
		Oct. 6.	Oct. 13.	Oct. 20.	Oct. 27.	Nov. 3.	Nov. 10.	Nov. 17.	Nov. 24.	Dec. 1.	Dec. 8.	
Akron, Ohio	85,625	.....	1	3	10	4	12	11	25	28	5	99
Alton, Ill	22,874	1	4	.....	.....	1	5	4	4	9	3	31
Butte, Mont	43,425	9	6	7	10	7	14	14	24	29	32	152
Cleveland, Ohio	674,073	24	1	16	21	5	17	18	26	21	32	181
Cumberland, Md	26,074	.....	.....	.....	.....	.....	.....	.....	10	1	1	12
Denver, Colo	260,800	1	2	8	.....	.....	11	7	18	13	(2)	60
Detroit, Mich	571,784	5	14	14	6	17	32	29	38	41	(2)	196
Flint, Mich	54,772	.....	(1)	.....	4	2	2	7	5	15	(2)	35
Fort Wayne, Ind	76,183	29	13	27	34	42	30	48	30	37	23	313
Grand Rapids, Mich	128,291	1	.....	2	6	1	2	.....	7	10	(2)	29
Indianapolis, Ind	271,708	22	5	17	19	19	9	24	20	40	54	229
Kansas City, Kans	99,437	2	9	6	11	19	28	23	30	47	37	229
Kansas City, Mo	297,847	9	24	26	24	33	50	78	67	79	140	530
Minneapolis, Minn	363,454	5	9	8	7	8	23	17	23	18	(2)	118
Oklahoma City, Okla	92,943	.....	2	.....	4	4	3	1	2	10	(2)	26
Omaha, Nebr	165,470	5	3	.....	10	7	55	17	77	44	59	277
St. Paul, Minn	247,232	5	7	(1)	9	19	5	28	22	22	(2)	117

[1] No report.

[2] Report not received in time for publication.